

likely to sustain eye injuries because of the continual chipping of steel and use of emery-wheels and machinery used in the construction of ships.

The Industrial Accident Commission advocates the wearing of goggles whenever workmen are liable to have their eyes injured. An individual pair of goggles for each man is advised because of the advantage of interesting him in what is practically his property and for the further good reason that men naturally object to wearing goggles that have been promiscuously used. The use of masks is urged for welders and babbitters. These goggles and masks are so strongly constructed that they not only fit the eyes but have shields at the side of each lens to prevent flying chips from entering the eyes from the sides.

Printed matter is used to advantage in emphasizing preventive methods. The National Safety Council issues posters drawing attention to the value of wearing goggles and masks. Sometimes these notices are printed in foreign languages. Special phrases are apt to attract the attention of workmen. For instance, one phrase that rivets the attention is: "You can see through glass goggles, but you can't see through glass eyes."

In all accident-prevention work the shop or factory safety committees are able to do much to reduce the death and injury tolls. Members of such committees will prevent a worker using his finger or his handkerchief, or a toothpick, in removing foreign bodies from the eye. This alleged "shop doctor" can do more mischief than an oculist can undo. Immediate and competent medical care may not only save the sight of an eye but save the employer or insurance company a considerable sum of money.

One serious objection to the use of goggles or masks in hot places is that the glass becomes clouded. There are available different kinds of "Anti-Sweat Pencils" that brighten the glass and prevent the clouded effect for several hours after each application.

The International Association for Labor Legislation has issued a list of 56 industrial poisons, of which number 36 affect the eyes. There is a continual effort to counteract the effect of these poisons and new inventions or methods are utilized as soon as they become known. The Commission recognizes the deleterious effects of wood alcohol and urges the use of denatured alcohol. The latter is just as good as wood alcohol and is safe and its use will save the sight of many an eye.

Properly ventilated and lighted workrooms have an important place in saving eyesight. Unshaded or flickering light should be avoided. Each shop or factory that has a saw-tooth roof with the upright portion filled with glass not only supplies the light for workmen so much to be desired, but enables them to escape that eye-strain that later on will lead to trouble. Dangerous fumes, vapors and gases can be removed by hoods and exhausts. The missed hole in blasting is a contributing factor to injured eyesight, and occasionally causes total blindness. The Commission's Mine Safety Rules require extraordinary care to see that all the shots have been fired. "Mushroomed" tools should be

replaced by good tools so that the chances of flying steel and iron are minimized. Precautions can easily be taken by means of special eye coverings to protect the eyes of men working among acids or engaged in sand blasting.

The Commission maintains a Safety Museum at 529 Market Street, San Francisco, and visitors are cordially invited. Among the more than 250 exhibits are eye protective devices, goggles and masks, as well as signs and posters, all aimed to throw every safeguard around the eyes of men and women that work in factory, shop or office. There will also be found a number of goggles broken by chips of flying steel or other material. The lenses are so strongly constructed that it is almost impossible to break them from the outside, though it is comparatively easy to break the glass by using pressure from the inside. As flying chips always strike the outside, this special construction gives the necessary protection to the eye.

### A PLEA FOR A COMPLETE UROLOGICAL DIAGNOSIS AT ONE SITTING.

(Preliminary Communication.)

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In a recent comprehensive treatise, dealing with the "comparative result of various functional kidney tests"<sup>1</sup>, a table is presented containing, in historical sequence, a fairly complete list of the many tests that have been devised for determination of renal function, the majority of which were introduced during the last fifteen or twenty years, or since the dawn of the era of scientific urology. As a result of this overproduction of renal tests, which were thrust upon the profession so frequently and at such short intervals as to prevent the average clinician familiarizing himself with their meritorious or objectionable features, a deplorable lack of uniformity has developed among urologists in various parts of the world as regards the estimation of the clinical value and preferential application of these tests. In diagnostically difficult cases, therefore, and especially in the relatively large numbers of renal lesions, where the indication for a radical operative procedure (nephrectomy), not rarely depends upon comparatively small differences in functional values, it has become customary at many clinics to perform several tests repeatedly at different cystoscopic sittings, in the hope of clinching, in this way, the preoperative diagnosis in a more exact manner.

It goes without saying, that some urological problems, even in most experienced and skilful hands, can only be solved on the basis of painstaking investigation, entailing more than one, and sometimes many prolonged cystoscopic sittings. In these comparatively rare cases, of course, the pain and discomfort to the patient, and the loss of time to the physician, incidental to repeated instrumentation, must be considered insignificant drawbacks as compared with the advantage of establishing by these means the otherwise unattainable diagnosis. This, though, is not true of the great majority of alleged or real lesions of the upper urinary tract, where at present the various

urological diagnostic methods, including pyelography, in many quarters are spread over several sittings, often separated by long intervals. It appeared, therefore, desirable that for these conditions, which constitute the daily routine work of the busy urologist, a definite diagnosis should be obtained in a single and comparatively brief cystoscopic sitting, covered by the application of a method of examination that is apt to combine reliable diagnostic results with least discomfort to the patient.

The most important object of urological investigation of a given case, especially from the standpoint of prognosis and treatment, consists in determining the degree of anatomical and functional impairment of the kidneys and, in the presence of unilateral involvement, in ascertaining the functional integrity of the presumably healthy organ. In ureteral catheterization we possess an exact method of obtaining total renal secretion in a separate form, and thus could easily arrive at satisfactory conclusions upon the actual amount of function performed by either organ, if we were able to collect the total quantity of catheterized renal urines during a certain time-period and thus formulate therapeutic indications on the basis of clean-cut arithmetic. Of the various reasons, why the solution of this problem is still wanting, it may suffice to mention the often occurring alteration of individual renal activity by reflex polyuria or oliguria, due to the introduction of the ureteral catheter.

Observation, therefore, of undisturbed renal activity by simple cystoscopy, as feasible by application of the indigocarmin test, recommends itself as a safe and simple method, which, according to an authoritative statement in the contemporaneous American literature<sup>2</sup> is "the most practical, useful and best test for the estimation of kidney sufficiency or insufficiency at the command of the surgeon today." The main advantage of the test, to our minds, is that, while it obviously does not permit us to ascertain with mathematical exactness the quantity of the functioning parenchyma of a kidney, its application, nevertheless, enables us to determine the difference in the activity of either organ and to recognize with accuracy, on which side the main part of renal work is performed, accomplishments which in the great majority of instances suffice for practical diagnostic purposes.

The disadvantages of intramuscular administration of indigocarmin (pain, loss of time in determining its appearance, etc.), are overcome by intravenous injection of the dye. In the beginning of our work we followed for intravenous indigocarmin administration the technic of Peterson<sup>3</sup> who injects 4 cc of the solution containing one grain of the dye, but soon found that three-fourths of a grain, or 0.05 of the powdered dye, dissolved in 3 cc of hot water yielded equally as satisfactory results as regards onset and intensity of dye-secretion. For observation of undisturbed kidney activity we would also suggest to arrange the cystoscopic sitting, according to Voelcker's<sup>4</sup> advice, for the morning hours and, after a rather

dry breakfast, not including coffee. In artificial polyuria the dye is excreted in a comparatively weak concentration, while the spurt occurs at an almost uninterrupted sequence and with such tonic intensity, as to cause its almost immediate mixture with the bladder fluid, which thus quickly assumes a blue color equal to that of the spurt and obviating by these means color-contrast observation. By carrying out the examination without artificial polyuria, on the other hand, a deeply colored spurt is obtained, which, owing to its higher specific gravity, sinks to the deepest part of the bladder, where it does not interfere with chromocystoscopy.

By applying the test to a large number of normal and to all available pathological cases during the last year, we were able to convince ourselves to our satisfaction, that the intravenous indigocarmin test, if carried out lege artis by an experienced observer, permits of trustworthy deductions as regards kidney sufficiency and insufficiency. For purposes of group comparison we decided, as in previous work of similar scope<sup>5</sup>, to utilize case groups of equal numbers for tabulation.

Tables 1 and 2 were prepared with the view of ascertaining the difference of parallelism of color-appearance and character of spurt in normal and pathological cases.

Table 1 demonstrates for normal cases average coincident appearance of indigocarmin on both sides in about 5 minutes, showing also good contraction of the meatus and a lively and deeply blue colored spurt.

Table 2 shows in about 90% of pathological cases, on the diseased side, delayed average appearance of indigocarmin, reduced intensity or absence of color-elimination, and a sluggish spurt emitted from a poorly contracted or gaping meatus.

The intravenous indigocarmin test, is also in pathological cases as simple as it is expeditious. For in the great majority of this class of cases indigocarmin appearance, as evidenced by the average of less than 12 minutes obtained in our work, may be expected in a reasonably short time.

For quantitative determination of comparative renal function we decided to employ one test of retention and one of elimination. Of the former tests the comparative urea test commends itself on account of its simplicity and its accurate results. The same is true of the intravenous phloridzin test which, according to a previous statement<sup>6</sup>, gives more accurate, and thus more reliable results, while its technic is as simple and less time consuming than that of the phenolsulphonephthalein test.

As ascertained by comprehensive experimental work, the ratio for comparative values of urea, phloridzin and phenolsulphonephthalein in normal cases was 104:107:187, showing a marked discrepancy of parallelism for phthalein as against almost equal values for phloridzin and urea. To the factors mentioned, in that connection, as the underlying reasons for this phenomenon (excretion of unequal amounts of urine by the kidneys, leaking of urine alongside the ureter catheter, reflex unilateral polyuria or anuria, etc.), must be added the uncertainty of quantitative colorimetric deter-

*Indigocarmine*      *Table I*      *Normal Cases*

No.	Sex	Age	Diagnosis	Meatoscopy						Remarks
				Appearance		Spurt		Color		
				R.	L.	R.	L.	R.	L.	
1.	male	59	prostatic hypertrophy	6	6	normal	normal	deep blue	deep blue	0.05 of the powdered dye dissolved in
2.	male	45	sexual neurasthenia	3	4	normal	normal	deep blue	deep blue	3 c.c. of hot water injected intravenously.
3.	male	23	gonorrheal polyarthritis	4	4	normal	normal	deep blue	deep blue	
4.	male	40	urethral caruncle	5	5	fairly good contraction	normal	blue	deep blue	
5.	male	40	chronic prostatitis	5	5	normal	normal	deep blue	deep blue	
6.	male	38	sexual neurasthenia	5	5	normal	normal	deep blue	deep blue	
7.	male	29	endonephritis imitable bladder	5	6	normal	normal	deep blue	deep blue	normal spurt = good contraction of mictus and active jet of urine.
8.	male	42	prostatic abscess	6	5	fairly good contraction	fairly good contraction	blue	blue	
9.	male	33	sexual neurasthenia	5	5	normal	normal	deep blue	deep blue	
10.	male	27	chronic gonorrheal prostatitis	5.5	4.5	normal	normal	deep blue	deep blue	
Average				4.95	4.95	normal	normal	deep blue in 90%	deep blue in 90%	

*Indigocarmine*      *Table II*      *Pathological Cases*

No.	Sex	Age	Diagnosis	Meatoscopy						Remarks
				Appearance		Spurt		Color		
				R.	L.	R.	L.	R.	L.	
1.	male	46	right-sided pyonephrosis	21	6	sluggish and scant	richly abundant	faintly blue	deep blue	0.05 of indigocarmine dissolved in 3 cc of
2.	male	19	left-sided pyelonephritis	4	6	full and abundant	sluggish and scant	deep blue	light blue	hot water injected intravenously.
3.	male	36	left-sided stone pyonephrosis	4	10	full and abundant	sluggish and scant	deep blue	faintly blue	normal spurt = good contraction of mictus and active jet of urine.
4.	male	41	right-sided colopyelonephritis	5	3	full and abundant	sluggish	deep blue	light blue	
5.	male	32	right-sided ureteral calculus	15	3	very sluggish	richly abundant	faintly blue	deep blue	sluggish spurt = rising of urine from pocket contracted or gaping meatus.
6.	female	21	right-sided colopyelitis	8	5	somewhat sluggish	full and abundant	light blue	deep blue	
7.	male	34	right-sided nephrothiasis	7	5.5	sluggish and scant	richly abundant	light blue	deep blue	In 80 to 90% of cases blue color
8.	male	42	right-sided colopyelitis	5.5	0.0 in 90 minutes	normal	no meatus visible	deep blue	no spurt visible	gradually increased in intensity on
9.	male	23	left-sided pyelonephritis	4.5	14	normal	sluggish and scant	deep blue	faintly blue	diseased side.
10.	female	40	bilateral pyelonephritis	4.5	10	normal	sluggish	deep blue	light blue	
Average				8.85	6.25	normal in 60%	normal in 40%	deep blue in 60%	color less in some cases	

*Comparative Indigocarmine, Phloidygin. Table III Normal Cases.*

No.	Sex	Age	Diagnosis	Appearance				Comparison		Remarks
				Indigocarmine R.	Indigocarmine L.	Phloidygin R.	Phloidygin L.	R.	L.	
1.	male	44	chronic prostatitis.	3	4	5	5	1.3	1.0	0.5 of powdered indigocarmine
2.	male	40	chronic prostatitis.	5	5	5	5	1.0	1.0	in 5cc of hot water injected intravaginally
3.	male	30	sexual neurasthenia.	5	5	4	5	1.0	1.25	
4.	female	29	endometritis mitable bladder.	5	6	4	4	1.2	1.0	
5.	female	38	urethral cauncle.	5	4	4	4	1.25	1.0	
6.	male	45	chronic prostatitis	5	5	5	5	1.0	1.0	2 cc of 1/2% phloidygin solution injected intra-venously.
7.	female	32	mitable bladder.	4.5	5	5.5	5	1.1	1.1	
8.	female	36	nephroptosis.	5	5	4.5	5	1.0	1.1	
9.	male	39	sexual neurasthenia.	5	5	5	4	1.0	1.25	
10.	female	24	gonorrheal urethro-trigmitis.	5	5	5	5	1.0	1.0	
Average				4.75	4.9	4.7	4.7	10.85	10.70	

*Comparative Indigocarmine, Phloidygin. Table IV Pathological Cases.*

No.	Sex	Age	Diagnosis	Appearance				Comparison		Remarks
				Indigocarmine R.	Indigocarmine L.	Phloidygin R.	Phloidygin L.	R.	L.	
1.	female	46	right-sided pyelonephrosis.	31	6	15	5	0.5	0.8	
2.	male	19	left-sided pyelonephritis.	4	6	7	8	0.6	0.75	Technique of indigocarmine and phloidygin injection the same as employed in previous tables.
3.	male	26	left-sided stone-pyelonephrosis.	4	10	6	22	0.6	0.45	
4.	male	41	right-sided coli-pyelonephritis.	5	3	12	8	0.4	0.375	
5.	male	32	right-sided ureteral calculus.	15	3	18	6	0.8	0.5	
6.	female	21	right-sided coli-pyelitis.	8	5	8	5	1.0	1.0	
7.	male	34	right-sided nephrolithiasis.	7	5.5	7	5	1.0	1.0	
8.	male	33	left-sided pyelonephritis.	4.5	14	9	17	0.5	0.8	
9.	female	40	left-sided pyelonephritis.	7	10	9	10	0.8	1.0	
10.	female	46	right-sided coli-pyelonephritis.	6	4	5	4	0.83	1.0	
Average				10.9	4.9	12.2	6.4	7.03	7.675	

*Comparative Indigocarmine, Phloridgin, and Urea.* Table I *Normal Cases.*

No.	Sex	Age	Diagnosis	Indigocarmine		Phloridgin		Urea		Comparison	Comparative percentage	Remarks
				R.	L.	R.	L.	R.	L.			
1.	male	48	chronic prostatitis.	5	5	2.0	2.0	0.005	0.006	1.0 : 1.0 : 0.83	94%	0.05 of indigocarmine dissolved in 2 cc of hot water
2.	female	42	urteral saruncle.	4	5	1.2	1.2	0.01	0.01	0.8 : 0.92 : 1.0	91%	and 2 cc of 1/2% phloridgin solution injected intra-venously.
3.	male	38	chronic prostatitis.	4.5	5	1.25	1.5	0.024	0.023	0.9 : 0.9 : 0.95	92%	
4.	male	28	sexual neurasthenia.	5	6	1.0	0.9	0.014	0.015	0.83 : 0.9 : 0.95	89%	
5.	female	46	nephropexis.	4	4.5	2.0	2.0	0.02	0.02	0.9 : 1.0 : 1.0	97%	Quantitative sugar determination made by means of Lohmann's reaction each-arcometer.
6.	female	29	endometritic urethritis and menitis.	5	5	1.5	1.3	0.01	0.01	1.0 : 0.9 : 1.0	97%	
7.	male	55	incipient prostatic hypertrophy.	6	5	0.66	0.7	0.08	0.085	0.83 : 0.95 : 0.9	89%	
8.	female	24	gonorrheal urethritis and trigonitis.	5	5	1.3	1.3	0.04	0.03	1.0 : 1.0 : 0.8	93%	Comparative urea determination made by means of
9.	male	38	chronic prostatitis.	5.5	5	1.6	1.8	0.014	0.012	0.95 : 0.9 : 0.87	91%	Doremus ureometers.
10.	male	33	right-sided hydrocele.	4.5	4.5	1.1	1.2	0.011	0.011	1.0 : 0.95 : 1.0	97%	
Average				4.85	5.0	1.371	1.4	0.0228	0.0232	Average percentage =	93%	

*Comparative Indigocarmine, Phloridgin, and Urea.* Table II *Pathological Cases.*

No.	Sex	Age	Diagnosis	Indigocarmine		Phloridgin		Urea		Comparison	Comparative percentage	Remarks
				R.	L.	R.	L.	R.	L.			
1.	male	41	right-sided colopyelonephritis	5	3	0.5	1.0	0.004	0.02	0.6 : 0.5 : 0.5	53%	Trace of phloridgin sugar found at 0.01
2.	male	48	right-sided pyelonephritis	6	4	0.9	2.5	0.005	0.012	0.66 : 0.26 : 0.42	48%	
3.	female	21	right-sided colopyelonephritis	8	5	0.56	0.26	0.005	0.01	0.625 : 0.46 : 0.5	53%	
4.	female	42	right-sided pyelonephrosis	31	6	trace	0.5	0.001	0.02	0.2 : 0.02 : 0.05	90%	
5.	male	19	left-sided pyelonephritis	4	6	0.6	0.5	0.013	0.011	0.66 : 0.83 : 0.84	78%	Quantitative sugar and urea determinations made in the same manner as in table I
6.	male	38	right-sided ureteral calculus.	15	3	0.4	2.0	0.005	0.01	0.2 : 0.2 : 0.5	30%	
7.	male	23	left-sided pyelonephritis	4	6	0.3	0.1	0.007	0.005	0.66 : 0.23 : 0.7	56%	
8.	female	42	right-sided pyelonephrosis	29	6	0.1	0.9	0.003	0.016	0.2 : 0.11 : 0.2	27%	
9.	female	46	right-sided colopyelonephritis	6	4	0.16	0.28	0.005	0.008	0.66 : 0.6 : 0.625	62%	
10.	female	30	right-sided hydronephrosis and nephropexis.	4	3	0.3	0.5	0.002	0.005	0.75 : 0.6 : 0.4	53%	
Average				11.6	4.2	0.323	0.914	0.0036	0.0121	Average percentage =	60.2%	

mination. For this reason alone we considered it best to reject a priori quantitative indigocarmine determination, as the ratio of error in colorimetric estimation appears to be even greater for this dye than for phthalein.

With the end in view of utilizing for our work the phloridzin in combination with the indigocarmine test, tables 3 and 4 were prepared, in order to ascertain the ratio of coincidence and discrepancy of appearance for both substances in normal and pathological cases.

Table 3 shows practically complete coincidence of indigocarmine and phloridzin-appearance for normal cases.

Table 4 shows in pathological cases for indigocarmine and phloridzin-sugar an equal discrepancy of about 50% between the healthy and diseased sides, and a parallelism of over 90% for bilateral appearance of both substances.

Finally, tables 5 and 6 were prepared with the view of ascertaining the ratio of parallelism between the qualitative indigocarmine and the quantitative urea and phloridzin tests.

Table 5 shows a bilateral parallelism of indigocarmine appearance, phloridzin-sugar quantity and urea quantity in 93% of normal cases.

Quantitative phloridzin and urea values showed for this class of cases the same bilateral parallelism of practically 100% as ascertained in previous experimental work<sup>7</sup>.

Table 6 shows for pathological cases an average coincidence of over 90% for indigocarmine appearance, phloridzin quantity, and urea quantity between the diseased and healthy sides.

Bilateral indigocarmine appearance and amounts for phloridzin and urea quantity show a parallelism of about 60%.

Bilateral values for phloridzin and urea quantity show also for this class of cases a parallelism of practically 100%.

Our work of testing comparative renal function in normal and pathological cases with the combination of the qualitative indigocarmine and the quantitative phloridzin and urea tests has proved to our satisfaction that the diagnostic evidence based upon parallelism in values obtained with these tests is, in the great majority of instances, sufficiently conclusive as to obviate the necessity of repeated investigation.

At present we carry out the complete urological examination at one sitting according to the following technic:

On the day preceding the examination the patient is prepared for radiography in the usual manner, and total renal function is tested by means of the two hours' phthalein test in connection with one or more blood-tests (cryoscopy, blood-urea), wherever indicated.

In some instances a codeine suppository gr.1 is administered per rectum half an hour before the appointed time of the cystoscopic sitting.

While the bladder, after anesthetization of the urethra, is cleansed and filled, the cystoscopic lamp, permeability of ureter catheters, etc., are tested, and the Brown-Buerger cystoscope containing the observation telescope is passed to the bladder. We

advise that in the male introduction of the cystoscope precede indigocarmine injection, as in our experience occasionally color elimination has commenced before the difficulty of passing the cystoscopic shaft beyond the external sphincter could be overcome.

The patient receives 0.05 powdered indigocarmine, dissolved in 3cc of distilled water heated to boiling, in one of his arm-veins, and the time of injection is noted. The next few minutes are spent in routine cystoscopic observation of the bladder-cavum. Meatoscopy starts at about 3 minutes after injection, and time of onset of dye-elimination, intensity of color-index, character of spurt, etc., on either side, are noted. The telescope is now exchanged with the double catheterizing one, both ureters are catheterized, and collecting of bilateral renal urines is started at once. Two cc of 1/2 per cent. phloridzin solution are now injected intravenously, and time of injection noted, appearance of sugar is ascertained, without delay, by means of test-tubes containing small amounts of heated Fehling's solution. It is essential that determination of appearance of sugar-reaction should be done by separate observers for each side. As soon as the time of sugar appearance for both sides has been noted, the cystoscope is removed and collecting receptacles marked "sugar" placed at the end of the ureteral catheters.

The patient is now removed to the X-Ray room where radiography of the renal and ureteral regions is done. At the end of this procedure sufficient urine, as a rule, has been collected for quantitative bilateral sugar determination. The final act of the examination consists in bilateral thorium-pyelography, by means of the gravity-apparatus.

Though a larger and particularly a more diversified material of pathological cases will have to be investigated prior to final adoption of our proposed method of examination as a routine measure, we feel nevertheless, upon the basis of the satisfactory results obtained so far, justified in preliminarily formulating the following conclusions:

It should be the aim of the urologist, whenever feasible, to obtain a complete diagnosis in one sitting.

Conclusive comparative renal function can be rapidly determined in one sitting with the combination of the qualitative indigocarmine and the quantitative phloridzin and urea-tests, as only small amounts of renal urines, not exceeding 5cc including microscopical examination, are required.

This single cystoscopic sitting can be carried through with relatively little discomfort to the patient, as instrumentation, in most instances, does not exceed 15 minutes.

In fairly experienced hands, and at well managed clinics, the diagnostic sitting can be completed in about one hour.

1. B. A. Thomas and J. C. Birdsall, *J. Am. Med. Assn.*, lxi, 21.
2. B. A. Thomas, *J. Am. Med. Assn.*, ix 3, p. 185.
3. *Surg. Gyn. and Obstet.*, xxv 5, p. 561.
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6. *L. C.*, p. 1871.
7. *L. C.*, p. 1868.